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[Document Name] Specification
[Title of Invention] Image Recording Device
[Claims]

[Claim 1] An image recording device comprising a
5 recording section that records images on a recording medium
and an image reading section that reads original images,
characterized by that:

the image reading section is supported so as to be
pivotal to slant downward to the front with respect to a
10 main body, opening a space above the recording section; and

a discharge tray that receives a document discharged
from the image reading section is detachably mounted on the
front end of the image reading section, the document
discharge tray being maintained at a predetermined angle
15 when in use and pivotal in a direction opposite the
pivoting direction of the image reading section.

[Claim 2] The image recording device as claimed in
claim 1, wherein the image reading section is arranged so as
to cover at least a part of the recording section from above.

20 [Claim 3] The image recording device as claimed in
claim 1 or 2, wherein the discharge tray and a discharge-
tray mounting section of the image reading section are
configured such that the discharge tray is mounted to the
mounting section from above.

25 [Detailed Description of the Invention]

[0001]

[Field of the Invention]

The present invention relates to an image recording device, and more particularly to attachment of a discharge
5 tray that receives an original document discharged from an image reading section.

[0002]

[Related Art]

Image recording devices having multiple functions,
10 such as those of a printer, facsimile, image scanner and copier, are known in the art. Fig. 6 shows an external-perspective view of this type of image recording device. Fig. 7 is a cross-sectional view showing the image recording device. Fig. 8 is a cross-sectional view showing the device
15 in which an image reading unit has been pivoted. The image recording device 100 includes a pair of left and right side covers 2 and 3 between which an image reading unit 4 for reading images from a document is pivotally mounted on a shaft 22. A recording section 5 for recording images is
20 disposed in a main body of the device, and the image reading unit 4 is vertically overlapping with and covering a portion of the recording section 5 for the sake of down-sizing and space-saving. A recording paper cassette 6 is mounted on the back portion of the main body for storing a stack of
25 recording papers.

[0003]

An operation panel 7 is disposed on the top surface of the image reading unit 4, and a document support portion 9 is disposed on the back portion of the image reading unit 4 for supporting facsimile or copy originals. A document discharge portion 10 is provided on the front surface of the main body. A document discharge tray 12 is mounted on mounting members 11' of the document discharge portion 10. A recording paper discharge portion 13 is disposed below the document discharge portion 10. A recording paper discharge tray 14 is mounted on the recording paper discharge portion 13.

[0004]

Fig. 9 is a plan view in which attaching portions of the document discharge tray 12 and the image reading unit 4 are shown in cross-section. The document discharge tray 12 is attached to the image reading unit 4 by engaging protrusions 54 of protruding pieces 53 of the document discharge tray 12 with holes 52 formed in a bottom-surface rib 51 of the image reading unit 4. Further in order to maintain a predetermined angle, the upper ends of the protruding pieces 53 are engaged with the bottom surface ribs 51, 56 of the image reading unit 4.

[0005]

In the image recording device 100, the image reading

unit 4 is pivotally supported to the main body at both sides. Therefore, in order to remove paper jammed at the recording section 5 or to supply ink to the recording section, as shown in Fig. 8, the image reading unit 4 is pivoted to open
5 a space above the recording section 5.

[0006]

[Problems to be Solved by the Invention]

However, according to the conventional image recording device 100 described above, as the image reading
10 unit 4 is pivoted to open a space above the recording section 5, the document discharge tray 12 moves along with the pivotal movement of the image reading unit 4, and the document discharge tray 12 abuts the recording paper discharge tray 14, thereby restricting the pivoting motion
15 of the image reading unit 4. That is, when the document discharge tray 12 abuts the recording paper discharge tray 14, the end section 12b of the document discharge tray 12 also comes into interference with the end section 4a of the image reading unit 4, and the protruding piece 53 comes into
20 abutment with the bottom-surface rib 56, prohibiting the document discharge tray 12 from changing its posture (pivoting) with respect to the image reading unit 4. Accordingly, when the document discharge tray 12 is being attached to the image reading unit 4, it is not possible to
25 pivot the image reading unit 4 so as to open a sufficient

space above the recording section 5. In order to pivot the image reading unit 4 so as to open a sufficient space above the recording section 5, the document discharge tray 12 must be detached from the image reading unit 4. This work
5 results in troublesome operation.

[0007]

Also, in order to attach the document discharge tray 12 to the image reading unit 4, the protruding pieces 53 of the document discharge tray 12 must be inserted into the
10 mounting members 11' of the image reading unit 4 from below. Therefore, an operator cannot visually confirm the engagement between the protrusion 54 of the protruding piece 53 and the hole 52 formed in the bottom-surface rib 51 of the image reading unit 4 from above the mounting members 11'.
15 Thus, the attaching operation is difficult.

[0008]

In view of the foregoing, it is an object of the present invention to provide an image recording device in which a sufficient space can be opened above a recording
20 section by pivoting an image reading section, capable of pivoting the image reading section so as to open a sufficient space above the recording section without detaching a discharge tray from the image reading section, and also capable of easily attaching the discharge tray on
25 the image reading section.

[0009]

[Means for Solving the Problems]

In order to attain the above and other objects, an image recording device according to claim 1 comprises a recording section that records images on a recording medium and an image reading section that reads original images, and is characterized by that the image reading section is supported so as to be pivotable to slant downward to the front with respect to a main body, opening a space above the recording section, and a discharge tray that receives a document discharged from the image reading section is detachably mounted on the front end of the image reading section, the document discharge tray being maintained at a predetermined angle when in use and pivotable in a direction opposite the pivoting direction of the image reading section. With this configuration, because the discharge tray can pivot in a direction opposite the pivoting direction of the image reading section, when the image reading section is pivoted to slant downward to the front with respect to the main body in order to open a space above the recording section, the discharge tray does not restrict the pivoting of the image reading section. Therefore, a space can be widely opened above the recording section while the discharge tray is being attached to the image reading section.

[0010]

The image recording device as claimed in claim 2 is the image recording device as claimed in claim 1, wherein the image reading section is arranged so as to cover at least a part of the recording section from above. With this configuration, the image reading section can be disposed above and partially overlapping with the recording section, whereby the device can be manufactured compact to save space.

[0011]

The image recording device as claimed in claim 3 is an image recording device as claimed in 1 or 2, wherein the discharge tray and a discharge-tray mounting section of the image reading section are configured such that the discharge tray is mounted to the mounting section from above. With this configuration, an operator can mount the discharge tray onto the mounting section while visually examining from above.

[0012]

[Embodiment]

Next, an image recording device according to an embodiment of the present invention will be described with reference to the accompanying drawings. Fig. 1 is an external view of a multi-functional device including a scanner, which is an image reading device of the embodiment.

The multi-functional device 1 includes various functions,

such as facsimile functions, printer functions, copying functions, and scanner functions.

[0013]

The multi-functional device 1 includes a box-shaped main casing. The left and right sides of the main casing are covered with side covers 2 and 3 as ornamental casing members. The side covers 2 and 3 are attached to a frame not shown in the drawings. An image reading unit (image reading section) 4 is disposed to freely pivot about a shaft portion 22 (see Fig. 2) with respect to the main casing at a position between the side covers 2, 3 and functions to read image from a document not shown in the drawings. A recording section 5 (see Fig. 2) is provided inside the main casing for recording images on a recording paper (recording medium). The image reading unit 4 is disposed to vertically and partially overlap and cover a portion of the recording section 5, thereby conserving space. A recording paper cassette 6 is mounted on the back portion of the main casing for storing a stack of recording papers.

[0014]

An operation panel 7 is disposed on the top surface of the image reading unit 4. The operation panel 7 includes an LCD display portion and a key operation portion. A document support portion 9 is disposed on the back portion of the image reading unit 4 to support a stack of copy originals to

be copied when using the copy function or facsimile originals to be transmitted to another facsimile device when using the facsimile function. A document discharge portion 10 is provided on the front surface of the main casing. A document discharge tray 12 is mounted on a mounting portion 11 of the document discharge portion 10. When mounting the document discharge tray 12 onto the mounting portion 11, protruding pieces 43 provided to the document discharge tray 12 are fitted into depressions 41 formed in the mounting portion 11 from above. A recording paper discharge portion 13 is provided below the document discharge portion 10. A recording paper discharge tray 14 is mounted on the recording paper discharge portion 13.

[0015]

Fig. 2 is a cross-sectional view showing the multi-functional device 1. Various components of the multi-functional device 1 will be described next. The image reading unit 4 includes a scanner 15. The scanner 15 includes an image sensor 17, such as a CCD. The image sensor 17 is exposed to a conveying path 16 through which a document set on the document support portion 9 is conveyed. In the conveying path 16, there are provided a separation roller 18 for separating and supplying the documents, a feed roller 19 for conveying the documents, and a discharge roller 20 for discharging the documents to the document

discharge portion 10 after the documents are read. The image reading unit 4 is supported via the shaft portion 22 on side frame plates 21 formed of metal or the like. The image reading unit 4 can pivot to slant downward to the front. This enables to open a space above the recording section 5 when necessary.

[0016]

The recording section 5 includes a recording head 25 of an inkjet printer for ejecting ink droplets. The recording head 25 is mounted together with an ink cartridge 27 on a carriage 26. During recording operations, the carriage 26 is moved in a scanning movement by a driving mechanism not shown in the drawings while guided on a carriage shaft 28.

[0017]

The recording paper cassette 6 includes a cassette case 31, a front cover 32, a support plate 33 urged by a spring and supporting recording paper, and a feed roller 34. A sheet of paper P set on the recording paper cassette 6 is separated and supplied to a conveying path 35 by the feed roller 34. Along the conveying path 35 are provided a feed roller 36, a platen 37 opposing the recording head 25, and a discharge roller 38 for discharging the recording paper P to the recording paper discharge portion 13 after recording. Drive mechanisms for driving each of these rollers are

omitted from the drawings. The document discharge tray 12 is provided with a support arm 12a. Even if a document size is larger than the document discharge tray 12, the document discharge tray 12 can support such document by extending the support arm 12a.

[0018]

Fig. 3 is a cross-sectional view showing the multi-functional device 1 in which the image reading unit 4 has been pivoted. As described above, the image reading unit 4 is configured to pivot about the shaft portion 22 to slant downward to the front. By pivoting the image reading unit 4, the document support portion 9 disposed above the recording section 5 moves to the front of the recording section 5, thereby opening a space above the recording section 5. This enables to perform maintenance operations on the recording section 5 or replace the ink cartridge 27. As the image reading unit 4 pivots, the document discharge tray 12 moves downward. The document discharge tray 12 is constructed to pivot in the direction opposite the pivoting direction of the image reading unit 4 when the document discharge tray 12 contacts the recording paper discharge tray 14. Hence, the orientation of the document discharge tray 12 with respect to the image reading unit 4 changes so as to not hinder pivoting of the image reading unit 4.

[0019]

Fig. 4 is a cross-sectional view of the multi-functional device 1 showing the attachment of the document discharge tray 12 to the image reading unit 4. A protruding portion 45 (see Fig. 2) is provided near the end of the document discharge tray 12 opposite the image reading unit 4 and extends toward the image reading unit 4. A bottom surface rib 46 is formed on the image reading unit 4. The document discharge tray 12 is maintained at a predetermined angle as shown in Fig. 2 by the protruding portion 45 engaging the bottom surface rib 46 at a position below the mounting portion 11. As described above, the document discharge tray 12 is mounted into the image reading unit 4 by fitting the protruding pieces 43 provided on the document discharge tray 12 into the depressions 41 from above and by inserting the protruding portion 45 of the document discharge tray 12 to the section beneath the mounting portion 11.

[0020]

Next, the construction for allowing pivoting of the document discharge tray 12 will be described. Fig. 5 is a plan view in which attaching portions of the mounting portion 11 of the image reading unit 4 and the document discharge tray 12 are shown in cross section. As described above, the mounting portion 11 provided to the front end section of the image reading unit 4 is formed with the

depressions 41, and the document discharge tray 12 is provided with the protruding pieces 43. Protrusions 44 are provided on the side surface of the protruding pieces 43. The depressions 41 are formed with holes 42 having a size corresponding to the protrusions 44. The size of the holes 42 is predetermined such that the protrusions 44 can pivot while being fitted into the holes 42. The document discharge tray 12 is supported on the image reading unit 4 by the protrusions 44 pivotally fitted into the holes 42.

[0021]

With this configuration, when mounting the document discharge tray 12 to the image reading unit 4, the protruding pieces 43 of the document discharge tray 12 are fitted into the depressions 41 of the mounting portion 11 of the image reading unit 4 from above, engaging the protrusions 44 with the holes 42. Also, as described above, the protruding portion 45 of the document discharge tray 12 engages with the bottom surface rib 46 of the image reading unit 4. As a result, the document discharge tray 12 is maintained at a predetermined angle with respect to the image reading unit 4, while being capable of pivoting in the direction opposite the pivoting direction of the image reading unit 4.

[0022]

As described above, according to the multi-functional

device 1 of the present embodiment, the document discharge tray 12 can pivot in the direction opposite the pivoting direction of the image reading unit 4. Therefore, even when the image reading unit 4 is pivoted to slant downward to the front in order to open a space above the recording section 5, the document discharge tray 12 does not restrict the pivoting of the image reading unit 4. Hence, when pivoting the image reading unit 4 in order to open a space above the recording section 5, it is not necessary to detach the document discharge tray 12 from the image reading unit 4. Also, because an operator can mount the document discharge tray 12 to the mounting portion 11 of the image reading unit 4 while visually examining from above the mounting portion 11, the operator can easily mount the document discharge tray 12 to the mounting portion 11.

[0023]

The present invention is not limited to the configuration of the above-described embodiment, but many modifications and variations may be made. For example, in the embodiment described above, the document discharge tray 12 is attached to the image reading unit 4 by fitting the protruding pieces 43 of the document discharge tray 12 into the depressions 41 of the mounting portion 11 of the image reading unit 4 from above and engaging the protrusions 44 with the holes 42. Also, the protruding portion 45 of the

document discharge tray 12 is engaged with the bottom 46 of the image reading unit 4 in order to maintain the document discharge tray 12 at a predetermined angle. However, it is possible to use another construction, provided the document discharge tray 12 is maintained at the predetermined angle when in use and capable of pivoting in the direction opposite the pivoting direction of the image reading unit 4.

[0024]

[Effects of the Invention]

As described above, according to the image recording device as claimed in claim 1, because the discharge tray can pivot in the direction opposite the pivoting direction of the image reading section, even if the discharge tray comes into contact with a table or the like on which the image recording device is set by pivoting the image reading section, the discharge tray does not restrict the pivotal movement of the image reading section. Hence, it is possible to fully pivot the image reading unit for widely opening a space above the recording section while attaching the discharge tray to the document reading section. Therefore, it is unnecessary to dismount the discharge tray from the image reading section for performing maintenance on the recording section or exchanging an ink cartridge.

[0025]

Also, according to the image recording device as

claimed in claim 2, in addition to the above described effects, the device can be constructed compact to save space since the reading section can be disposed above and in overlapping with the recording section.

5 [0026]

According to the image recording device as claimed in claim 3, in addition to the above described effects, the discharge tray can be easily mounted on the mounting section since an operator can mount the discharge tray into the mounting portion while visually confirming from above.

[Brief Description of the Drawings]

[Fig. 1]

An external view of a multi-functional device including a scanner which is an image reading device according to an embodiment of the present invention.

[Fig. 2]

A cross-sectional view of the multi-functional device.

[Fig. 3]

A cross-sectional view showing the multi-functional device in which an image reading unit has been pivoted.

[Fig. 4]

A cross-sectional view showing the multi-functional device for explaining an operation for attaching a document discharge tray to the image reading unit.

25 [Fig. 5]

A plan view of the multi-functional device, wherein attaching portions of the document discharge tray and the image reading unit are shown in cross-section.

[Fig. 6]

5 An external perspective view of a conventional image recording device.

[Fig. 7]

A cross-sectional view showing the image recording device.

10 [Fig. 8]

A cross-sectional view showing the image recording device in which an image reading unit has been pivoted.

[Fig. 9]

15 A plan view of the image recording device in which attaching portions of the document discharge tray and the image reading unit are shown in cross section.

[Description of Numberings]

1 multi-functional device (image recording device)

4 image reading unit (image reading section)

20 5 recording section

11 mounting portion

12 document discharge tray (discharge tray)

P recording paper (recording medium)

[Document Name] Abstract

[Abstract]

[Object] To provide an image recording device in which a space can be opened above a recording section by pivoting an image reading unit without detaching a discharge tray from the image reading unit and the discharge tray is easily attached to the reading section.

[Configuration] An image reading section 4 is supported by a shaft so as to be capable of pivoting to slant downward to the front with respect to a main body. A document discharge tray 12 is attached to the front end of the image reading section 4 such that the document discharge tray 12 is maintained at a predetermined angle when in use and pivoted in a direction opposite the pivoting direction of the image reading unit 4 when the image reading unit 4 pivots. With this construction, it is possible to open a space above the recording section 5 without the document discharge tray 12 restricting the pivotal movement of the reading unit 4 while the document discharge tray 12 is being attached to the image reading section.

[Selected Drawing] Fig. 3

Fig. 1

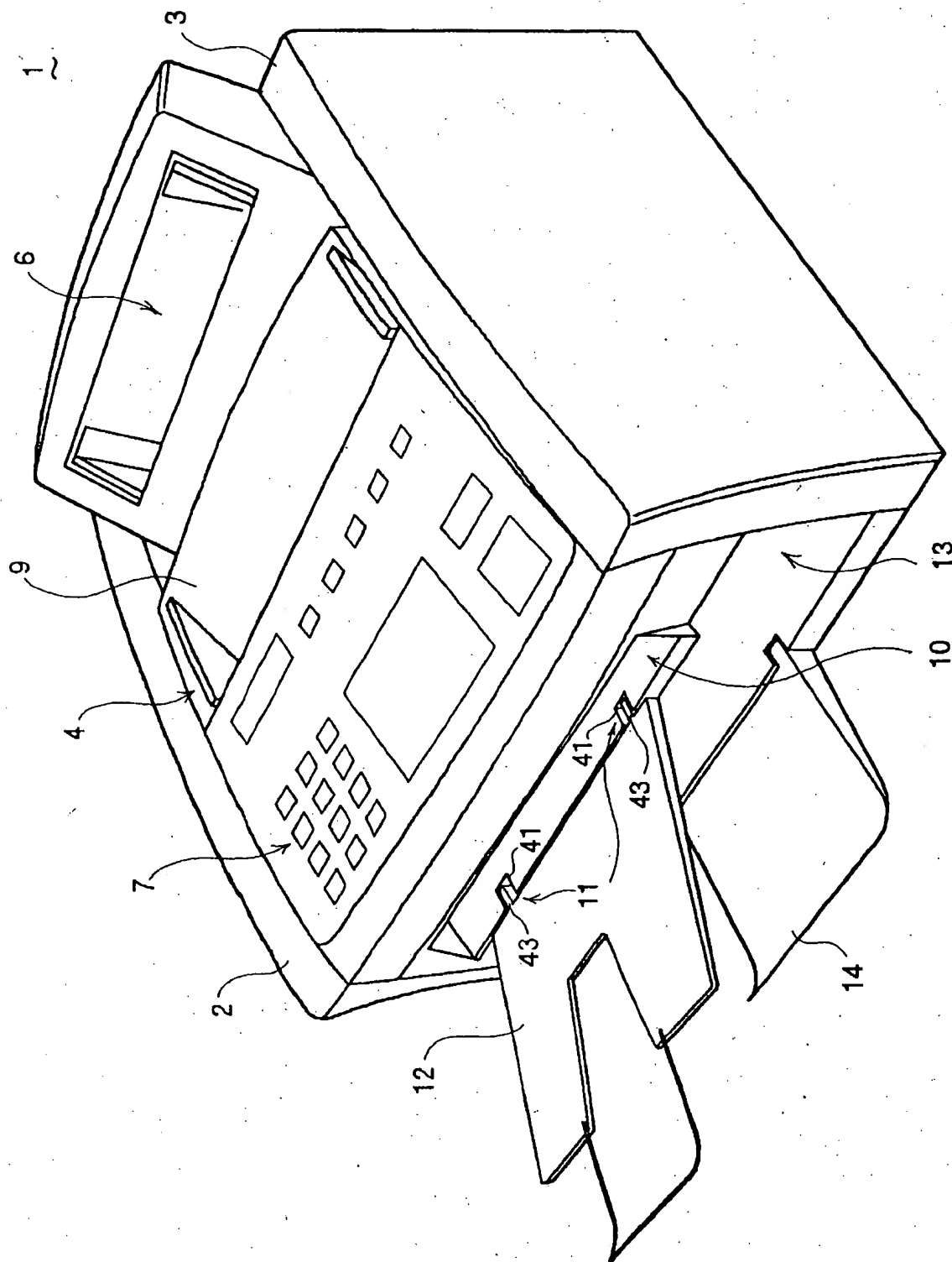


Fig. 2

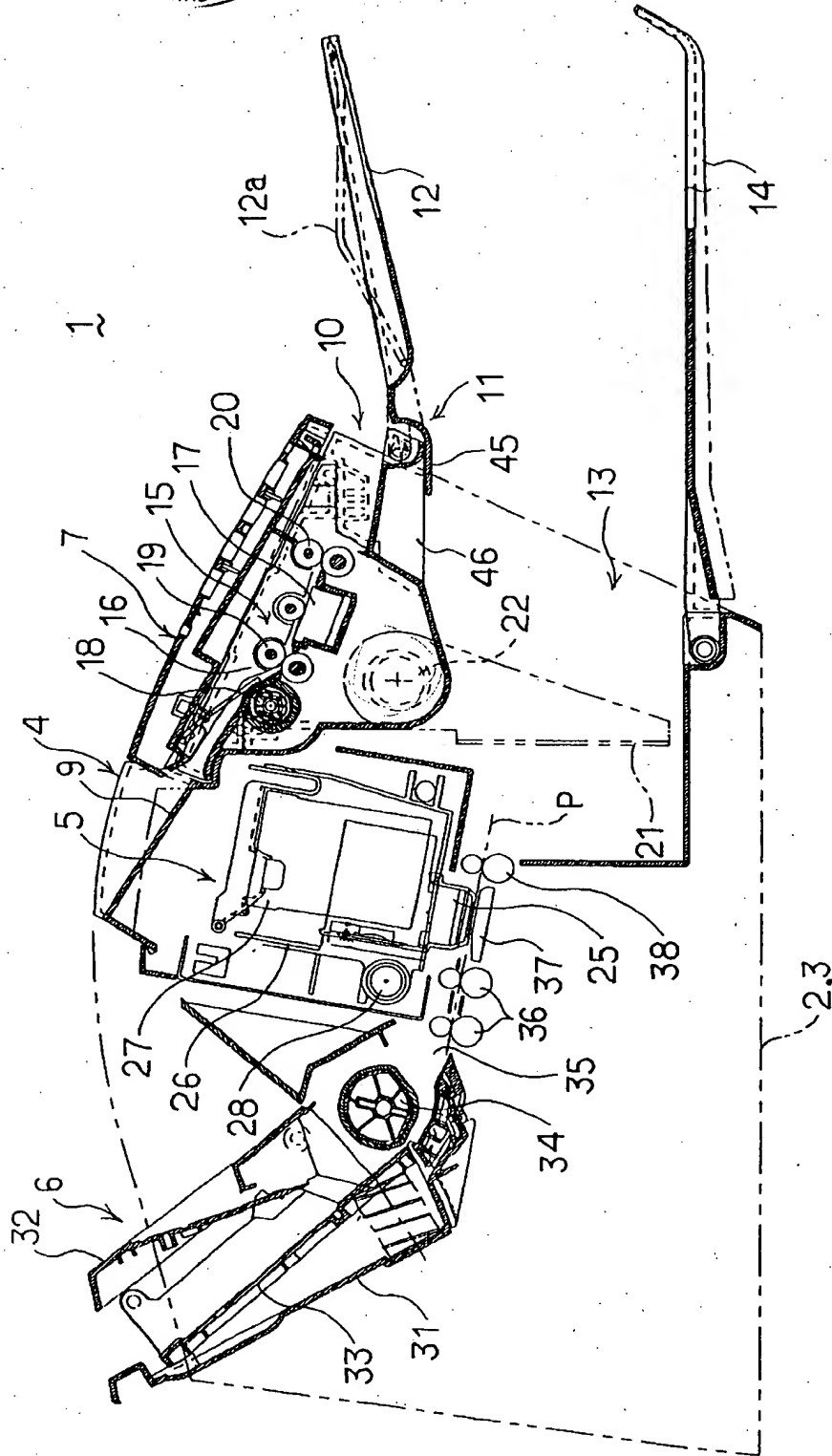
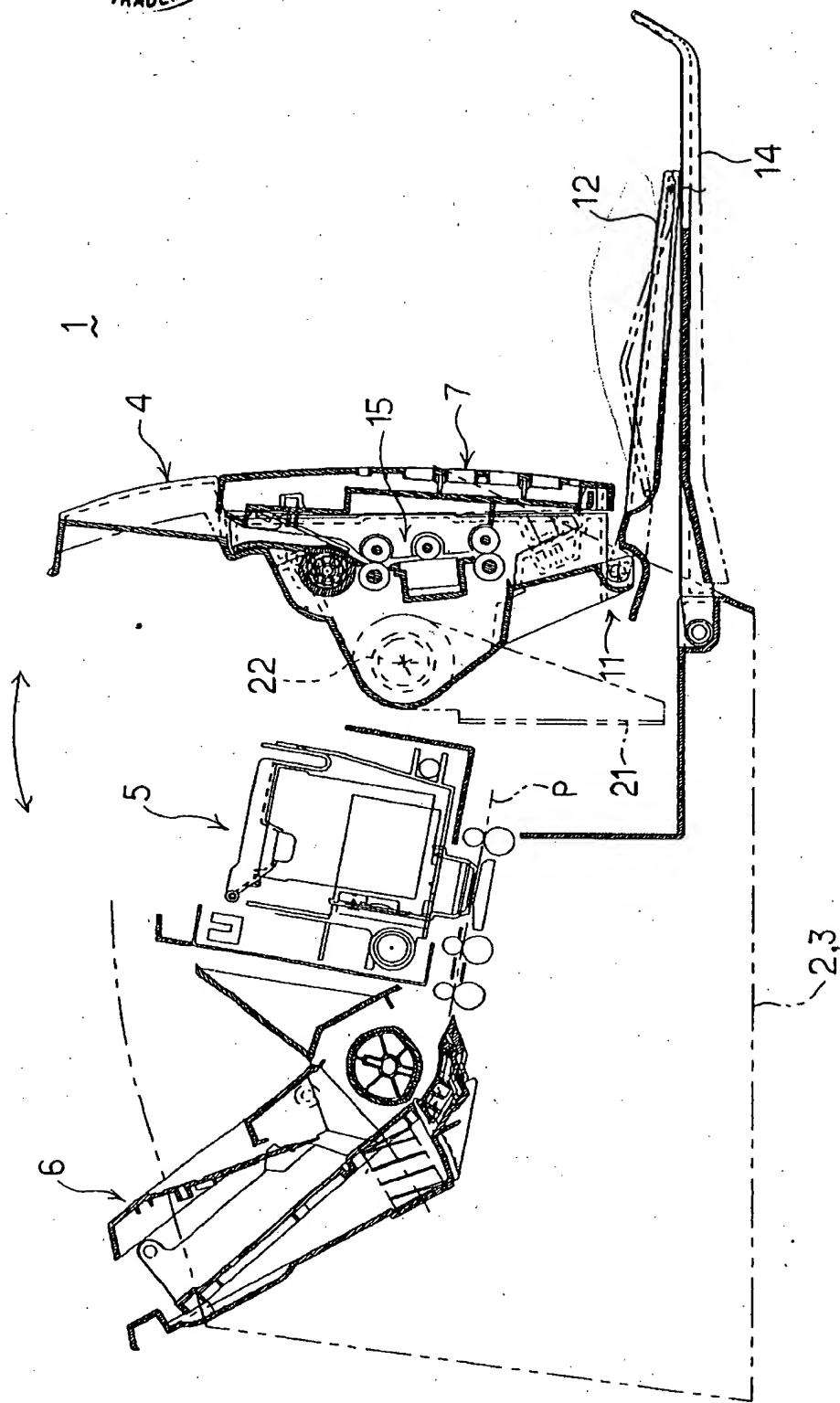


Fig. 3



A circular black ink stamp from the Office of Intellectual Property (OIPE). The text "OIPE" is at the top, "JUN 01 2004" is in the center, and "PATENT & TRADEMARK OFFICE" is at the bottom.

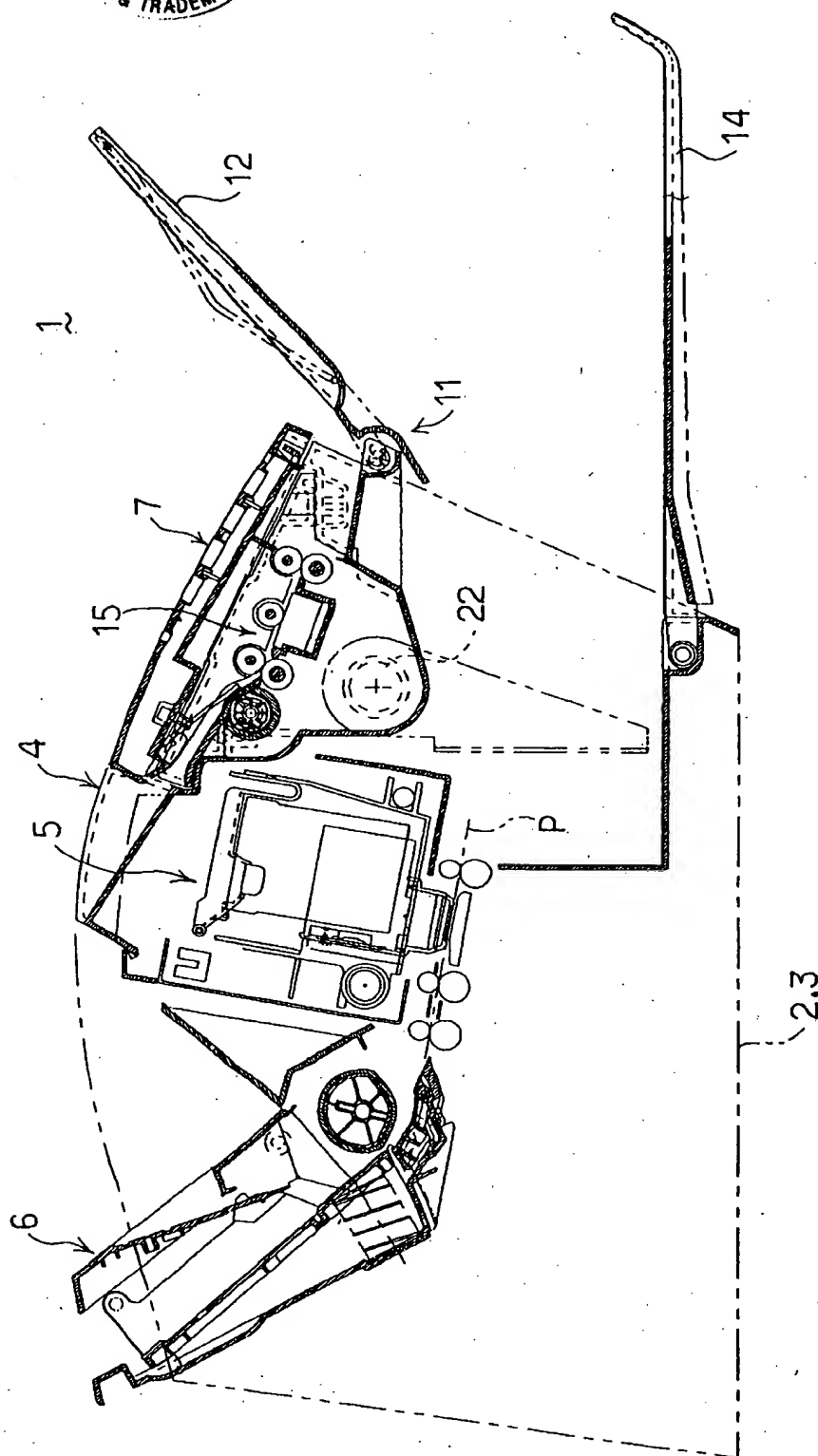


Fig. 5

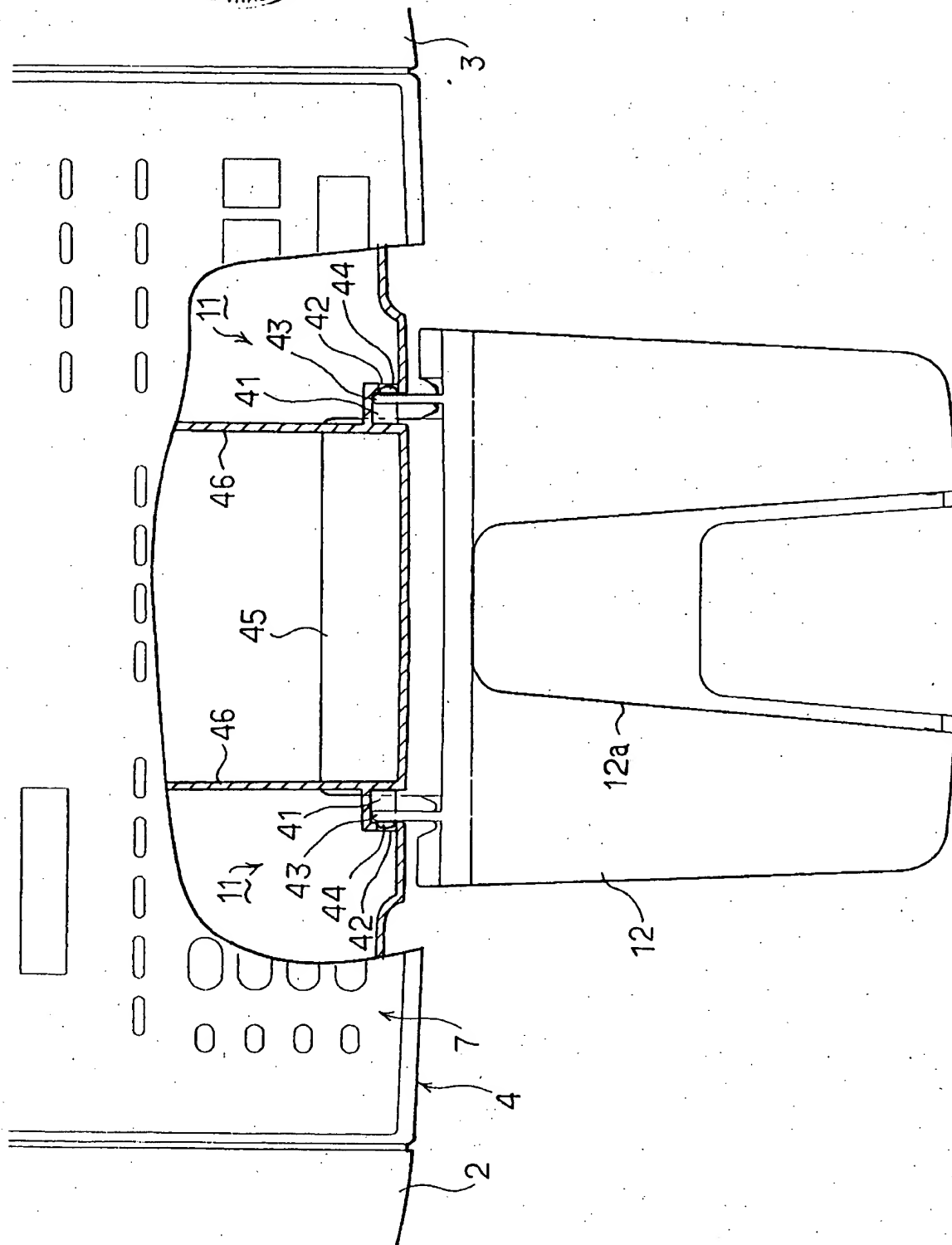


Fig. 6

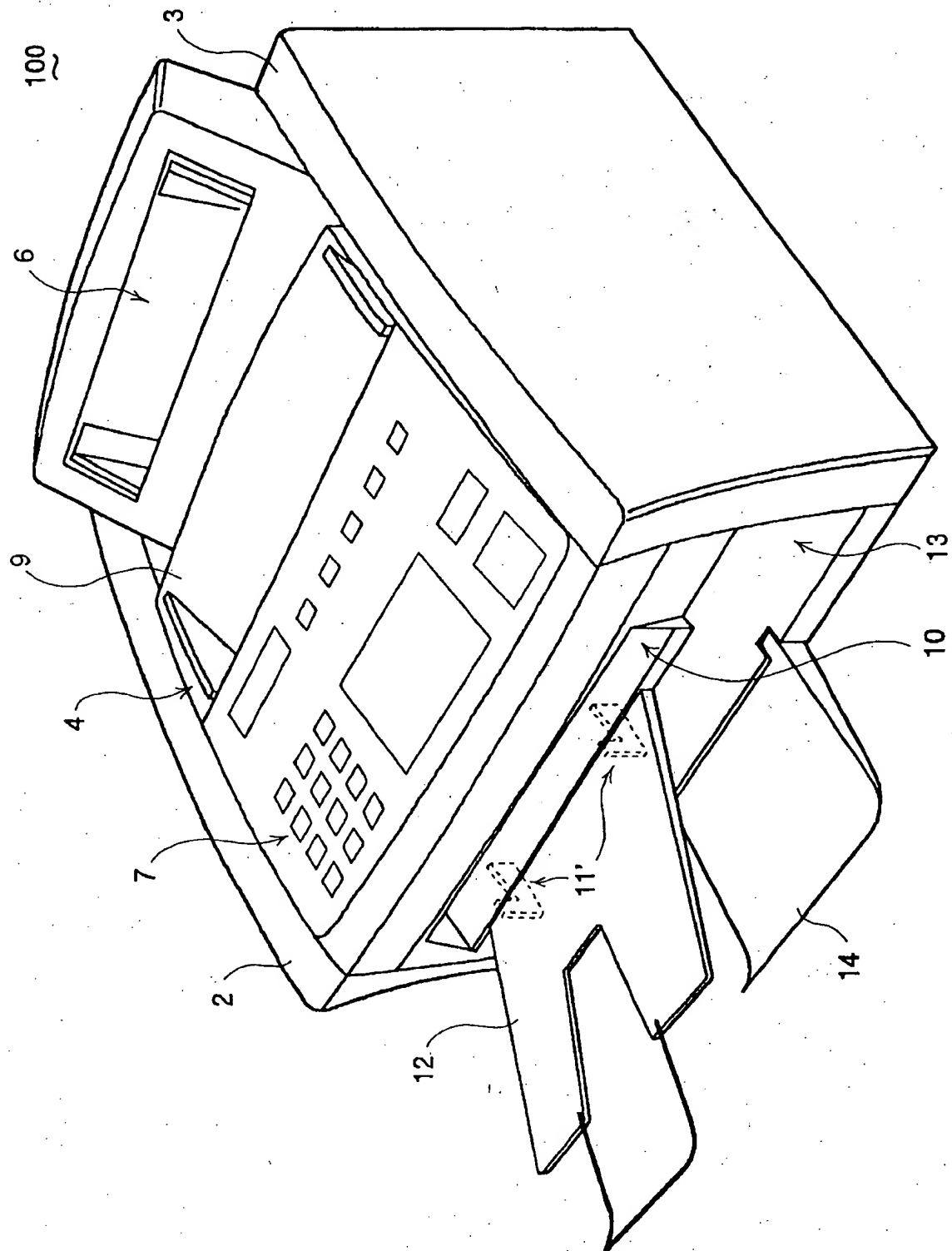


Fig. 7

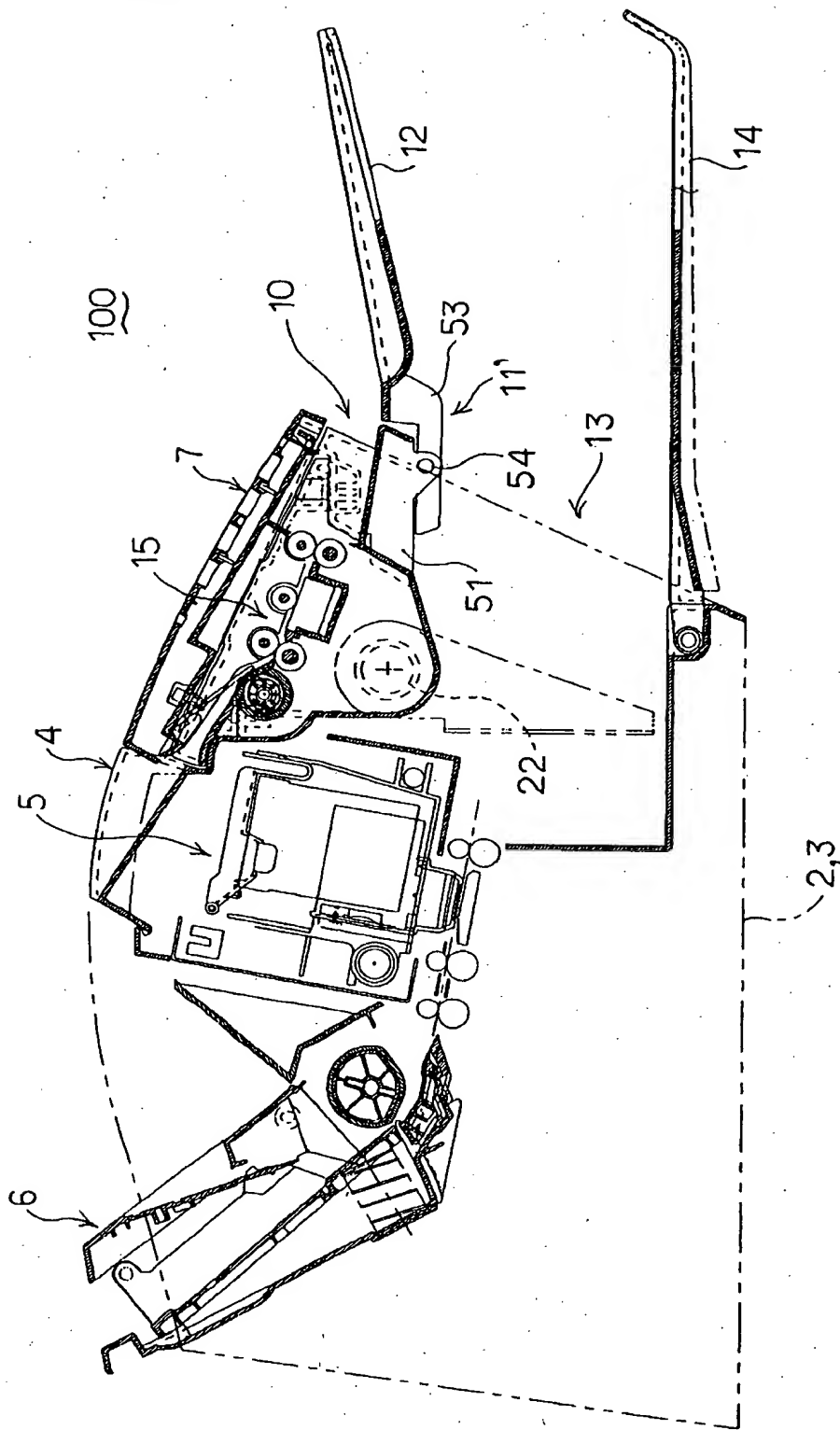


Fig. 8

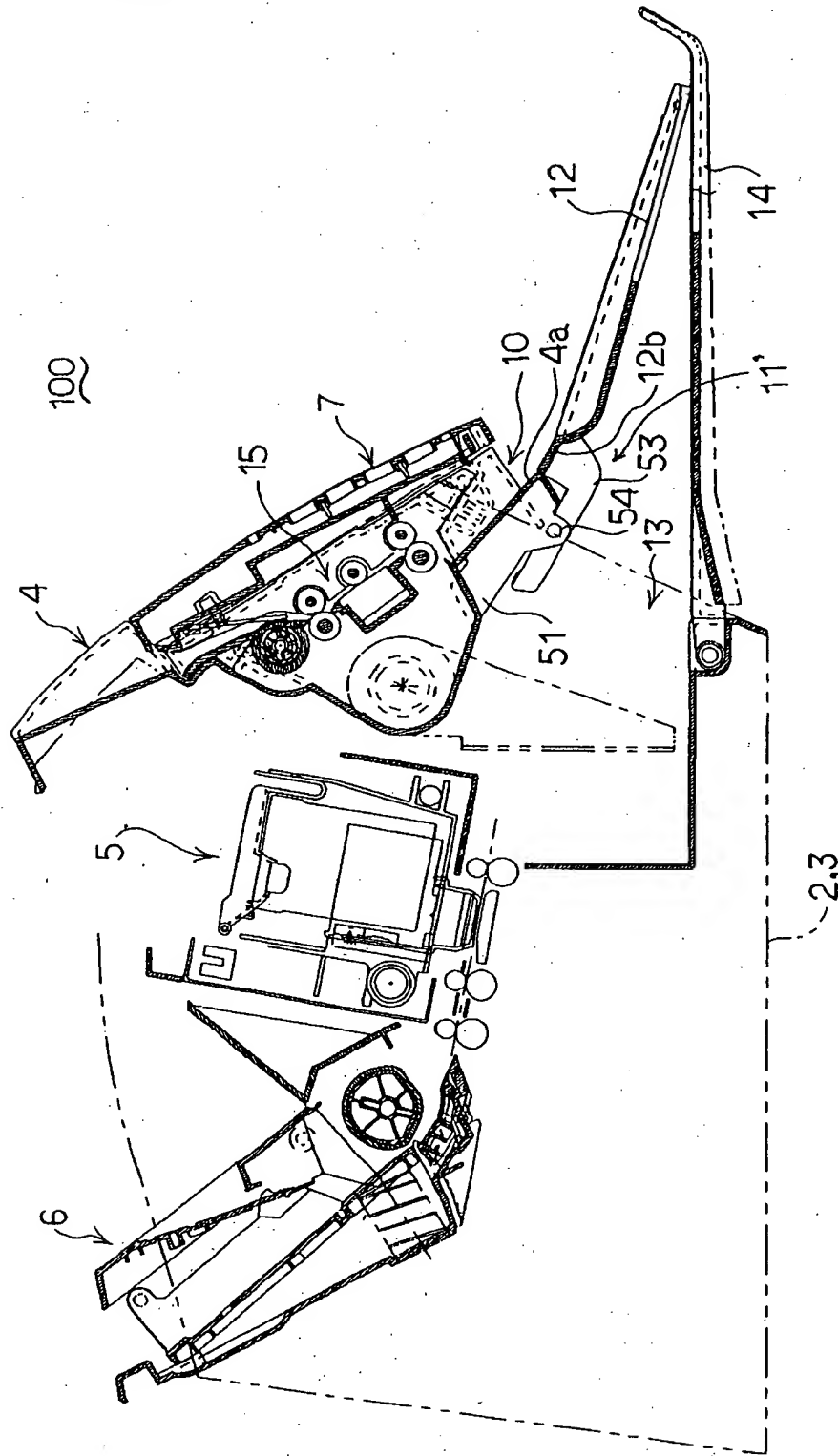


Fig. 9

